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Remarks

Thorough examination by the Examiner is noted and appreciated.

The claims have been amended to clarify Applicants disclosed invention and new claims added.

For example support for the amendments is found in the previously presented claims, the Figures including Figure 2, and in the Specification.

No new matter has been entered.

Claim Rejections under 35 USC 112

1. claims 1-4, 7, 8, 11, 12, and 21-31 stand rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

Examiner asserts that the language adjustably controlling liquid flow on said substrate backside during said development process is without support in the Specification. Examiner requests

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that Applicants particularly point out the passage in the originally filed specification to proved support of "the adjustably controlled liquid flow on the backside of the substrate".

Examiner has not explained why one of ordinary skill in the art would not understand from Applicants disclosure that Applicants had not explained and described:

"An apparatus for dispensing a liquid onto a substrate frontside and backside during a development process and adjustably controlling liquid flow on said substrate backside during said development process to improve a rinsing step"

Applicants have previously cited to Examiner support for the added language in the Specification:

Beginning at page 16, line 1:

"In use, the vertical position of the knife ring is initially adjusted such that the upper edge of the knife ring is disposed at a gap distance of from typically about 0.1 mm to about 0.4 mm with respect to the backside of the wafer.

As the developing liquid is dispensed onto the wafer, this gap distance is sufficient to prevent or at least substantially reduce flow of the developing liquid from the upper surface of the wafer, around the wafer edges, along the backside of the wafer and to the wafer chuck, respectively, by capillary action.

After processing, the gap distance is subsequently adjusted to a value of typically

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from about 1.4 mm to about 1.5 mm, wherein the knife ring is disposed in the lower position beneath the wafer, to facilitate thorough rinsing of the developing liquid from the wafer backside and enhance passage of the rinsing fluid and removed developing liquid between the upper edge of the knife ring and the wafer backside."

Thus, Applicants have explicitly described the operation of the apparatus where during dispensing of the developing liquid onto the wafer, the gap distance between the knife ring edge and the wafer is set at a first distance "to prevent or at least substantially reduce flow of the developing liquid from the upper surface of the wafer, around the wafer edges, along the backside of the wafer". The gap distance is subsequently adjusted to second distance prior to a rinsing step to "enhance passage of the rinsing fluid and removed developing liquid between the upper edge of the knife ring and the wafer backside".

Thus, it would be clear to one of ordinary skill that Applicants have explicitly described their invention:

"An apparatus for dispensing a liquid onto a substrate frontside and backside during a development process and adjustably controlling liquid flow on said substrate backside during said development process to improve a rinsing step"

Applicants respectfully refer Examiner to the following relevant portions of the MPEP and the case law:

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#### ADEQUACY OF WRITTEN DESCRIPTION

##### *A. Read and Analyze the Specification for Compliance with 35 U.S.C. 112, para. 1*

Office personnel should adhere to the following procedures when reviewing patent applications for compliance with the written description requirement of 35 U.S.C. 112, para. 1. The examiner has the initial burden, after a thorough reading and evaluation of the content of the application, of presenting evidence or reasons why a person skilled in the art would not recognize that the written description of the invention provides support for the claims. There is a strong presumption that an adequate written description of the claimed invention is present in the specification as filed, *Wertheim*, 541 F.2d at 262, 191 USPQ; however, with respect to newly added or claims, applicant should show support in the disclosure for the new or amended claims.

"[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." *In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968)

It is now well accepted that a satisfactory description may be in the claims or any other portion of the originally filed specification.

See MPEP, 8<sup>th</sup> Ed, Section 2163 (I)

While there is no *in haec verba* requirement, newly added claim limitations must be supported in the specification through express, implicit, or inherent disclosure.

See MPEP, 8<sup>th</sup> Ed, Section 2163 (I) (B)

The fundamental factual inquiry is whether the specification conveys with reasonable clarity to those skilled in the art that, as of the filing date sought,

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applicant was in possession of the invention as now claimed. See, e.g., *Vas-Cath, Inc.*, 935 F.2d at 1563-64, 19 USPQ2d at 1117.

Possession may be shown in many ways. For example, possession may be shown by describing an actual reduction to practice of the claimed invention. Possession may also be shown by a clear depiction of the invention in detailed drawings or in structural chemical formulas which permit a person skilled in the art to clearly recognize that applicant had possession of the claimed invention. An adequate written description of the invention may be shown by any description of sufficient, relevant, identifying characteristics so long as a person skilled in the art would recognize that the inventor had possession of the claimed invention. See, e.g., *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323, 56 USPQ2d 1481, 1483 (Fed. Cir. 2000)

Applicants respectfully contend that one of ordinary skill would clearly understand that Applicants invention encompasses and explicitly describes:

"An apparatus for dispensing a liquid onto a substrate frontside and backside during a development process and adjustably controlling liquid flow on said substrate backside during said development process to improve a rinsing step"

Thus, Examiner is mistaken that Applicants have not provided support in their disclosure and Examiner has not explained how or why one of ordinary skill would not understand that Applicants had

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possession of their invention according to the plain meaning of Applicants claim language, and has therefore failed to make out a *prima facie* case that Applicants language fails to comply with the written description requirement.

Claim Rejections under 35 USC 103

1. Claims 1-4, 7, 8, 11, 12, and 12-31 stand rejected under 35 USC 103(a) as being unpatentable over Tanaka et al. (US 5,689,749) in view of Shirakawa et al. (JP 07045514).

Tanaka et al. disclose a double edged seal ring (item 40; Figures 2, 3, 4, 5) having an **inner ring edge** (42; Figures 8A-8D) **for preventing rinse liquid flow** (60) **past a gap** (clearance) (59) (i.e., **rinse liquid is held in place at clearance** 59) defined by a clearance between the inner ring and the substrate backside (col 7, lines 32-36; lines 46-50). The outer ring edge (43) **prevents developer fluid** (50; Figures 8A-8D) dispensed on the top of the wafer from **flowing past the clearance** (59) between the outer ring and the substrate **backside** (see col 8, lines 15-30; or, if some developer flows past the clearance it is collected in groove (41) between the inner and outer rings and discharged.

In another embodiment, a single seal ring (24; Figure 11) **with**

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a flat upper surface (col 9, lines 33-39) operates to form (trap) a liquid film between the clearance (59) created between the flat upper face of the ring and the backside of the substrate **for both the developer solution and the rinse liquid** (col 9, lines 44-47; col 10, lines 34-44; lines 47-54; claims 1 and 5). The creation of the liquid film in the gap (59) during the rinsing process removes the developer from the gap (59) (col 10, lines 53-54).

Tanaka et al. also discloses top faces of the liquid seal ring of different shapes including being flat, having grooves (Fig. 13), being recessed (Fig 14) and having the top face inclined outwardly (a plane inclined at an angle of 1 to 5 deg with respect to a flat surface which is placed facing the wafer backside); (see Figure 15; col 7, lines 23-37). Tanaka et al. teach that in the **inclined planar face shape**, the developing solution tends to flow outwardly of the liquid seal ring, as must the rinse liquid (i.e., there is no flow of liquid between the closest point of the inclined planar surface and the substrate (gap).

In all embodiments, the ring (single or double) is fixed by bolts to a lower cup during the development process (col 5, lines 52-56; Figures 4, 13, items 24h, 24d).

Tanaka et al. discloses carrying out tests in a development

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**process** (including both applying development solution and rinse fluid) where the gap (clearance) (59 or B) was varied (implicitly by bolting the ring in place prior to the development process with varying clearances) over a range of 0.5mm to 1.5mm (col 8, lines 55 - col 9, line 27. The results for preventing flow of both rinsing liquid and developer was found to depend primarily on the width of the top face of the ring (col 9, lines 15-26).

Thus, Tanaka et al. fail to disclose several aspects of Applicants disclosed and claimed invention including:

"An apparatus for dispensing a liquid onto a substrate **frontside and backside during a development process and adjustably controlling liquid flow on said substrate backside during said development process to improve a rinsing step,**"

Nowhere to Tanaka et al. disclose or suggest an apparatus that can accomplish the function of "**adjustably controlling liquid flow on said substrate backside during said development process to improve a rinsing step**"

As clearly pointed out in the disclosure, as noted above, the liquid flow (developer liquid) on the backside of the substrate is

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substantially prevented from flowing past the knife ring edge during a development step of the development process and adjusted to allow a rinse liquid to flow past the knife ring edge during a rinse step.

Tanaka et al. further nowhere disclose Applicant structure of:

**"a knife ring having a base and a tapered edge extending upward from said base to form an upper edge, said knife ring vertically adjustably mounted beneath said support;**

Rather, as pointed out, Tanaka et al. do not disclose a **knife edge** as one of ordinary skill in the art would understand the plain meaning of the language, but rather disclose an **inclined planar face**. Tanaka et al. further do not disclose **knife edge** having a **tapered edge extending upward from a base to form an upper edge** as one of ordinary skill in the art would understand the plain meaning of the language.

See e.g., MPEP 2111.01:

During examination, the claims must be interpreted as broadly as their terms reasonably allow. This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification. *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). See also *In re Marosi*, 710 F.2d 799,

When not defined by applicant in the specification,

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the words of a claim must be given their plain meaning.  
In other words, they must be read as they would  
be interpreted by those of ordinary skill in the art. *In  
re Sneed*, 710 F.2d 1544, 218 USPQ 385 (Fed. Cir.

1983). Tanaka et al. further nowhere disclose:

**a plurality of independently-actuated automatic vertical adjustment mechanisms operably engaging said base of said knife ring, said plurality of independently-actuated automatic vertical adjustment mechanisms adapted to place said upper edge of said knife ring at selected vertical positions beneath the substrate during said development process to adjustably control liquid flow on said substrate backside."**

Examiner further erroneously argues with support anywhere in the disclosure of Tanaka et al. that Tanaka et al. disclose:

**"wherein said vertical positions are selected from a position facilitating flow of liquid between said upper edge of said knife ring and a substrate backside and a position substantially preventing flow of liquid between said upper edge of said knife ring and said substrate backside."**

Examiner refers to Figure 24h in Figure 3 which show that the

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ring fixedly bolted in place to an inner container 26 of a cup 20 (col 5, lines 49-57). Tanaka et al. nowhere disclose that that the ring is adjustable during a development process. Having erroneously argued that Tanaka et al. disclose Applicants structure, Examiner then argues "to have the ring adjusted is deemed to have little patentable weight in that it is old and well known to employ an automatic mechanism in place of manual actuation".

However, Examiner ignores the fact that Tanaka et al. nowhere discloses Applicants **structure** including:

"a plurality of independently-actuated automatic vertical adjustment mechanisms operably engaging said base of said knife ring, said plurality of independently-actuated automatic vertical adjustment mechanisms adapted to place said upper edge of said knife ring at selected vertical positions beneath the substrate during said development process to adjustably control liquid flow on said substrate backside."

"A statement that modifications of the prior art to meet the claimed invention would have been ``well within the ordinary skill of the art at the time the claimed invention was made'' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to

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combine the teachings of the references." *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993).

Thus, before Examiner can rely on the argument of automating a manual activity, **Applicants structure must be shown** in the prior art. It is further not clear what manual activity (adjusting fixed bolts? of Tanaka would be automated.

Moreover, Examiner ignores the fact that there is no motivation (**as a matter of law**) to modify Tanaka et al. to achieve Applicants structure since such modification would **change the principle of operation** of the ring of Tanaka et al. which is **to stop the fluid flow past the gap between the ring and the substrate backside**. Tanaka et al. nowhere suggests operation of their ring e during a development process that would allow liquid flow past the gap between the ring and the substrate backside, and such modification would make the apparatus of Tanaka et al. **unsuitable for its intended purpose**.

"If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious." *In re Ratti*, 270 F.2d 810, 123, USPQ 349 (CCPA 1959).

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"If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification."

*In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).*

Examiner further relies on Shirakawa et al. (Japan '514) asserting that Shirakawa disclosing automatic adjustment for adjusting a knife ring during the development process as claimed. Examiner cites to no specific portion or drawing of Shirakawa et al. (Japan '514) to support his assertion of disclosure in Shirakawa.

The Abstract of Shirakawa et al. discloses an apparatus, like Tanaka et al.'s that stops liquid flow by capillary phenomenon with a cylindrical wall (4) (see Abstract). Applicants cannot find anywhere where Shirakawa discloses automatic adjustment for adjusting a knife ring during the development process, as Examiner alleges.

Even assuming *arguendo*, that Shirakawa discloses automatic adjustment for adjusting a knife ring during the development process, there is no motivation to modify Tanaka et al. (as a matter of law), since such modification would change the principle of operation of Tanaka et al. and make the apparatus of Tanaka et al. **unsuitable for its intended operation of stopping liquid flow past the gap between the ring and the substrate backside.**

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"First, there must be some **suggestion or motivation**, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a **reasonable expectation of success**. Finally, the prior art reference (or references when combined) **must teach or suggest all the claim limitations**. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure."

*In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).*

Moreover, nowhere do Tanaka et al. recognize or provide a solution to the problem that Applicants have recognized and solved by their disclosed and claimed invention:

"An apparatus for dispensing a liquid onto a substrate **frontside and backside during a development process and adjustably controlling liquid flow on said substrate backside during said development process to improve a rinsing step,**"

Rather, the apparatus of Tanaka et al. **presents the very problem** that Applicants disclosed and claimed invention solves.

Examiner Arguments

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Examiners argument that the inclined planar ring surface of Tanaka et al. is equivalent to Applicants "knife ring having a base and a tapered edge extending upward from said base" ignores the plain meaning of Applicants terms as they would be understood by one of ordinary skill in the art.

Examiners argument that the fixed bolt mounting mechanism of Tanaka et al. is equivalent to Applicants "plurality of independently-actuated automatic vertical adjustment mechanisms operably engaging said base of said knife ring" further ignores the plain meaning of Applicants claim language. Tanaka et al. further, clearly do not disclose or suggest:

**"said plurality of independently-actuated automatic vertical adjustment mechanisms adapted to place said knife ring edge at selected vertical positions beneath the substrate during said development process to adjustably control liquid flow on said substrate backside;"**

Examiner's argument that since Tanaka et al. disclose a controller 35, for operating a fluid source for sprayers, a vacuum pump for the cup to remove excess fluid, and for moving the wafer support vertically, that such controller would also be capable of being programmed to achieve Applicants invention (adjust fixed

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bolts?), would not be workable, recites the wrong standard for a determination of obviousness of **structure, and further**, even assuming Examiner could show Applicants structure in the prior art, any attempted modification of Tanaka et al. in an effort to achieve Applicants invention **would be invalid as matter of law since it would change the principle of operation of the apparatus of Tanaka et al. and make it unsuitable for its intended operation.**

Conclusion

The cited references do not produce or suggest Applicants disclosed and claimed invention and therefore are insufficient to make out a *prima facie* case of obviousness with respect to both Applicants independent and dependent claims.

Based on the foregoing, Applicants respectfully submit that the Claims are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited."

In the event that the present invention as claimed is not in condition for allowance for any reason, the Examiner is respectfully invited to call the Applicants' representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

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Respectfully submitted,  
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